

METHACRYLATE PRODUCERS ASSOCIATION, INC.

GLOBAL PRODUCT SAFETY SUMMARY: METHYL METHACRYLATE

(Last Updated: 9/27/19)

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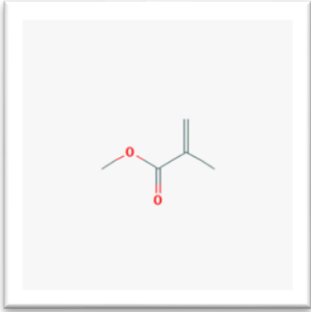
SUBSTANCE NAME

Methyl Methacrylate

GENERAL STATEMENT

Methyl Methacrylate (MMA) is produced by industry for use as a building block to make a wide range of polymer-based products that we see and use every day from acrylic glass, car paints, toners and inks, oil additives to dental and medical products. MMA in its current uses is of low concern to human health and the environment. It is classified as hazardous (highly flammable, irritant to skin and respiratory system, sensitizing by skin contact and harmful to aquatic life). However, industry and professionals have handled it safely for over 60 years. MMA-based polymers are inert in the environment and polymers made solely from MMA can be recycled back to the monomer.

CHEMICAL IDENTITY

Name:	Methyl Methacrylate
Synonym:	2-Methyl-propenoic acid, methyl ester
CAS name	2-Propenoic acid, 2-methyl-, methyl ester
CAS number(s):	80-62-6
IUPAC name:	Methyl 2-methylpropenoate
Molecular formula:	C ₅ H ₈ O
	

USES AND APPLICATIONS

MMA is produced by industry for use as monomer for the production of polymers and as intermediate for synthesis of other methacrylate esters. MMA is manufactured in industrial settings in closed systems and used by industry for manufacture of polymers in closed and semi-closed systems. Downstream use of MMA is almost exclusively in the form of polymer although some products used by professionals and hobbyists may contain quantities of the liquid monomer. MMA monomer has been used in artificial nails; however, MPA member companies and the US Food and Drug Administration (FDA) advises against the use of MMA in nail products on the basis that MMA is a recognized skin sensitizer. Additionally, bans on the use of MMA in nail products are in place in at least 32 states in the US, as well as Canada and New Zealand.

PHYSICAL/CHEMICAL PROPERTIES

The following table includes information, which refers to testing performed with the concentrated (liquid) monomer substance. It is not intended to be comprehensive or to replace information found in the Safety Data Sheet (SDS). A SDS may be obtained from one of the manufacturers.

Property	Value
Physical state	Liquid
Color	Colorless
Odor	Pungent
Density	0.94 g/cm ³ at 20 °C
Melting point	-48 °C at 1013.25 hPa
Boiling point	100.36 °C at 1013.25 hPa
Flammability	Highly flammable
Explosive properties	Not explosive
Self-ignition temperature	400 °C
Vapor Pressure	37 hPa at 20 °C
Molecular Weight	100.1
Water solubility	15300 mg/L at 20 °C
Flash point	10 °C at 1013.25 hPa (closed cup)
Octanol-water partition coefficient (Log Kow)	1.38 at 20 °C

HUMAN HEALTH SAFETY ASSESSMENT

Information for the general population and consumers handling products made with methyl methacrylate.

Consumer

The majority of MMA is converted to polymers before being used in consumer products. Therefore, exposure to MMA in these products is unlikely. Some professional, DIY and hobbyist products may contain liquid MMA monomer. Direct skin contact with liquid monomer could produce skin irritation, and repeated contact could lead to skin sensitization (allergy or dermatitis). Inhalation of high levels of vapors may irritate the respiratory system.

Worker

MMA is produced in essentially closed systems so that significant worker exposure during monomer manufacture is unlikely. Workers may come into contact with MMA during polymer production and professional use of products containing liquid monomer. The health effects following skin contact or inhalation of the vapors would be the same as for the consumer.

The following table includes information for someone handling the concentrated (liquid) monomer substance. The data, while verifiable, are not intended to be comprehensive nor replace the information found in the SDS.

Effect Assessment	Result
Acute Toxicity	Low toxicity after acute oral, dermal and inhalation exposure.
Irritation	Causes irritation to the skin and respiratory system. Not irritating to the eyes.
Sensitization	Sensitizing by skin contact. Click here for a technical summary. By weight of evidence, does not cause asthma .
Mutagenicity	Not mutagenic. Click here for a technical summary. No evidence of carcinogenicity. Click here for a technical summary.
Toxicity after repeated exposure	MMA can cause damage to the part of the nose responsible for detection of smell when consistently inhaled over a longer period of time. Other effects in the body are non-specific.
Toxicity for reproduction	Does not harm reproduction or cause birth defects at levels that are not toxic to the mothers. Click here for a technical summary.

ENVIRONMENTAL SAFETY ASSESSMENT

Based on available data MMA is of moderate toxicity to aquatic organisms. MMA is fully and rapidly biodegradable. While MMA is not intentionally released during manufacturing processes and use, MMA released to air or trace amounts present in wastewater streams would rapidly disappear by chemical and biological degradation. MMA does not possess significant ozone depletion potential.

The following tables include information for testing performed with the concentrated (liquid) monomer substance. Additional information may be obtained from the SDS supplied by the manufacturer.

Effect Assessment	Result
Aquatic Toxicity	Moderate toxicity to aquatic organisms on an acute basis.

Fate and behaviour	Result
Biodegradation	Readily biodegradable
Bioaccumulation potential	Not bioaccumulative
PBT / vPvB conclusion*	Does not meet criteria for PBT or vPvB classification
Environmental impact	Unlikely to persist in, or have significant impact on, the environment. Click here for a technical summary.

* Persistent/Bioaccumulative/Toxic (PBT) very Persistent-very Bioaccumulative (vPvB)

EXPOSURE

Consumer

Consumer exposure to MMA is generally limited to products containing polymers made with MMA. These polymers contain extremely low levels of residual monomer. Exposure of consumers to liquid monomer is therefore unlikely, unless they use professional, DIY or hobbyist products that contain significant levels of liquid monomer. In that case, exposure can occur if consumers have direct skin and/or nail contact with the liquid monomer. In addition, inhalation of vapors may be unintentional or unavoidable when using such products. Direct skin and/or nail contact in cosmetic ([artificial nails](#)) uses may be unavoidable and such use is not recommended.

Worker

MMA is produced in essentially closed systems; therefore, significant worker exposure during manufacture is unlikely. Workers may come into contact with MMA during polymer production and professional use of products containing liquid monomer.

RISK MANAGEMENT RECOMMENDATIONS

Consumer

For consumer use of products containing MMA-based polymers, risk management measures relating to the very low MMA residues in those polymers are not indicated. Use of professional, DIY and hobbyist products that contain liquid MMA monomer will require the user to follow the guidance provided by the product manufacturer on the packaging or product label. This will depend upon the product composition, but may include recommendations to avoid skin contact (to prevent skin irritating/sensitizing properties) and to provide good general ventilation (to prevent irritation of the respiratory system by high concentrations of the vapors) when handling the uncured (liquid, unpolymerized) product. To avoid clogging of drains and unintentional exposures, uncured (liquid, unpolymerized) product should not be poured down the drains or disposed of in domestic waste. Any applications involving direct skin and/or nail contact with the liquid monomer that are not under the direct supervision of a medical or dental professional are not recommended (for further reference, see [MPA's policy regarding the use of methacrylates in artificial nails](#)).

Worker

As for any substance, workers should follow the recommended safety measures as provided by the manufacturer in the Safety Data Sheet. Considering the skin irritating and sensitizing properties of MMA, this typically will include avoiding skin contact or the wearing of suitable protective gloves and avoiding inhalation of high concentrations of vapor by use of one or more of the following: engineering controls, good general ventilation or personal protective (respiratory) equipment, depending upon the particular use conditions.

REGULATORY INFORMATION / CLASSIFICATION AND LABELLING

This substance is subject to a number of federal and international statutes and regulations. Selected U.S. regulatory information is available on the [MPA website](#). Other federal, state and local regulations may apply.

This substance has been registered under the EU chemical control law known as REACH (Registration, Evaluation, Authorisation and Restriction of Chemical substances), and is listed on various chemical inventories. It has been reviewed under the OECD SIDS (Screening Information Data Set) program.

While the toxicological data are not specific to a particular region, the regulatory frameworks differ between countries and regions. The Global Harmonized System (GHS) attempts to standardize hazard communication so that the intended audience (workers, consumers, transport workers, and emergency responders) can better understand the hazards of the chemicals in use. Under the GHS, substances are classified according to their physical, health, and environmental hazards.

Note: The hazard statements and symbols presented here refer to the hazard properties of the concentrated substance and are meant to provide a brief overview of the labelling for the substance. It is not intended to be comprehensive or to replace information found in the SDS.

Classifications:

- Flammable liquid: Category 2
- Acute Toxicity: Category 5 (inhalation)
- Skin Irritation: Category 2
- Skin Sensitization: Category 1
- STOT Single Exposure: Category 3 (respiratory tract irritation)
- Aquatic acute: Category 3

Labelling

Signal word: Danger

Hazard pictogram:

GHS02:



GHS07: exclamation mark



Hazard statements:

H225: Highly Flammable liquid and vapour.

H315: Causes skin irritation.

H317: May cause an allergic skin reaction

H335: May cause respiratory irritation.

H402: Harmful to aquatic life (Not used in some countries including USA and EU)

ADDITIONAL INFORMATION

Information on registered substance (ECHA)

<https://echa.europa.eu/registration-dossier/-/registered-dossier/15528>

EU Risk Assessment

<https://echa.europa.eu/documents/10162/7c9a0eb6-9b7f-4fd6-846b-d480e8e0003d>

OECD High Production Volume (HPV) Screening Information Dataset (SIDS)

https://hpvchemicals.oecd.org/ui/SIDS_Details.aspx?id=56b5aa4e-044a-4a1d-8aca-9dcf9e1a0a8c

CONTACT

For further information on this substance or product safety summaries in general, please contact [MPA](#). Click on the logos below to go to the company's website.



Glossary

Acute toxicity - harmful effects after a single exposure

Bioaccumulation - accumulation of substance in an organism

Biodegradation- chemical breakdown of substances by a physiological environment

Carcinogenicity - effects causing cancer

Concentrated - Non-formulated undiluted substance

ECHA – European Chemicals Agency

EU - European Union

GHS - Global Harmonized System

Hazard - situation bearing a threat to health and environment

HPV - High Production Volume

IUPAC – International Union of Pure & Applied Chemistry

Log Kow - Log Octanol-Water Partitioning Coefficient

Mutagenicity - effects that change genes

PBT/ vPvB - Persistent, Bioaccumulative and Toxic/very Persistent and very Bioaccumulative

OECD-Organisation for Economic co-operation and Development

REACH - Registration, Evaluation, Authorisation and Restriction of Chemical substances

SDS - Safety Data Sheet

Sensitizing - causes allergies

SIDS - Screening Information Data set

STOT – Specific Target Organ Toxicity

Disclaimer

This document is not intended to be comprehensive. It is provided solely as background information and should not substitute for an up-to-date Safety Data Sheet or research should specific regulatory or other legal questions arise. It is not intended to be a statement of legal requirements when using or handling acrylates. Although the information is believed to be accurate as of the last update, new information may become available and regulations frequently change, and no warranty, expressed or implied, is made concerning the contents. In addition, many states and localities adopt their own regulations, which are not covered by this summary or on the [MPA website](#). In all events, the user should consult applicable laws and regulations, as well as their supplier's Safety Data Sheet, for current information and requirements. **NO WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE, WARRANTY OF MERCHANTABILITY, OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, IS MADE CONCERNING THE INFORMATION PROVIDED HEREIN.**